

been the secretion of spicules, formed by cells, probably at first very few in number, of the dermal layer, which continually increased in numbers and in importance, not only for the better support and protection of the sponge body and in particular of the reproductive cells, but also, perhaps, for entangling and capturing the nutritive particles brought by the water current. Clearly, so delicate an organism could only maintain its existence in tranquil water. The ancestors of the Calcareo and Demospongiæ, by the development of a thick and often very tough mesogloea and a highly differentiated dermal layer, attained to the degree of firmness necessary for life in the littoral zone. The Hexactinellids, with a more primitive type of histological structure, have retained also their ancient deep-sea habitat.

Enough has been said to show the important results of Prof. Iijima's researches. We may add that the plates accompanying the work are a credit, not only to the author, but also to Japanese lithography. We shall await further instalments with much interest. E. A. MINCHIN.

INSTRUCTION IN VILLAGE SCHOOLS.

Rural Readers. Book I. By Vincent T. Murché. Pp. 168. (London: Macmillan and Co., Ltd., 1901.)

The Teacher's Manual of Object Lessons for Rural Schools. Books I. and II. By the same author. Pp. 231 and 252.

THESE books have been written by the headmaster of the Boundary Lane Board School, Camberwell, to meet the requirements of teachers in rural schools as laid down in the suggestive circular recently issued by the Board of Education. Mr. Murché claims to be an old hand at rural education, and the books before us certainly bear out his claim. If properly used, teachers will find them most valuable guides in introducing nature study into elementary schools. Their value is so much dependent on their mode of use that the author's caution, as given in the preface, must be kept well in mind. He says,

"These books are not intended to form a rigid cast-iron scheme of lessons, to be blindly followed by every teacher into whose hands they may fall. They are rather to be considered as a store-house from which the teacher may draw, to suit his own special conditions; and further, the ample provision of subjects in each volume will enable him for years to construct scheme after scheme, all of them dealing with just those subjects which will appeal to country children."

A brief summary of the contents will enable our readers to form an idea of the ground covered. Book I. (Object Lessons) contains forty lessons, grouped under six headings; lessons from simple natural phenomena such as the air, the sky, the sun, clouds and rain, wind and weather, &c.; round about the farm; lessons on the seasons; animals kept on the farm; and some useful minerals. Book II. contains forty lessons, grouped under lessons from animals, domestic and wild; lessons from birds; lessons from plants, and a number of miscellaneous lessons. The "Reader," of which the first part only is at present before us, is arranged in dialogue form and is to be used in conjunction with the corresponding volume of object lessons. We

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have nothing but praise for Mr. Murché's little books. They are the best of the kind that have hitherto come under our notice, and should go a long way towards facilitating that kind of teaching which all those who have taken part in the modern revival in rural education have been so anxious to see introduced into village schools. The great danger attending the use of such books is of course the tendency shown by teachers to make a fetish of the printed page. It is so much easier to teach didactically and to pump information into pupils from printed books than it is to develop their individual powers of observation and reasoning that extreme advocates of the "heuristic" method might take exception to the present volumes, as calculated to play too much into the hands of the teacher and to leave too little to the pupils themselves. But this danger is not confined particularly to rural education; it lurks in the pages of teachers' manuals in every branch of science, and if the publication of such works has injured the cause of true education it is more frequently the teachers than the authors who are at fault.

With respect to rural education in particular, it must not be forgotten that it has lagged far behind the education in towns, and that now—largely owing to the work of the Agricultural Education Committee—it is in a state of transition. The practical difficulties in the way of rational teaching in village schools are familiar to all who have attempted to grapple with the problem. Not the least of these difficulties is the imperfect education of the teachers themselves. Some of the technical instruction committees, as in Essex, have done good work through their normal classes, but much remains to be done before a body of teachers thoroughly trained in the requirements and in full sympathy with the objects of rural education can be called into existence. There are teachers in many such schools who are anxious to meet the new conditions now made possible through the enlightened policy of the Board of Education if they are helped in the way that Mr. Murché has attempted to help them by showing what there is to teach and how to teach it. If conducted rationally and scientifically, these object lessons will certainly accomplish the purpose for which they are written.

There is one little side issue to which the writer of this notice is glad of the present opportunity of calling attention. Now that the education of country children is making a serious departure in the right direction, the time seems ripe for inculcating that respect for living nature which is generally absent in the average child. Boys and girls are naturally destructive animals. The teachers in rural schools can do more than any other class of people to restrain and direct this tendency. They have to deal with children at the most impressionable period of their lives, and they have it in their power to point out exactly why wanton destruction is to be deprecated. The collecting of the common forms of animal and vegetable life for the purposes of study, *i.e.* for educational purposes, might be encouraged judiciously, but the ruthless destruction that accompanies the ordinary country ramble should be severely censured. If hordes of village school children are to be taken out into the country without proper restraint, the "nature study" is apt to degenerate into a mere collecting raid with no

educational value and with serious consequences to our native fauna and flora. The teachers have it in their hands to impress upon their pupils that nothing is to be gained and everything to be lost by plucking every flower because it looks pretty, by raiding every nest because it is good sport, or by killing every insect that looks strange. If by proper tuition the child can be made to realise how infinitely more instructive and interesting is the living organism than the dead "specimen," a well-organised course of nature study should have as distinct a moral influence as it is intended to have an intellectual influence in moulding the character of the pupil. For this reason we should like to see in such works as those under consideration special and emphatic recommendations to teachers to repress all unscientific collecting.

R. MELDOLA.

HEDDLE'S MINERALOGY.

The Mineralogy of Scotland. By the late M. Forster Heddle, M.D., F.R.S.E., Emeritus Professor of Chemistry, St. Andrews. Edited by J. G. Goodchild, H.M. Geological Survey, F.G.S. Two vols. Pp. 148 and 212. (Edinburgh: David Douglas, 1901.)

NO book is of more use to the practical mineralogist and collector than one which describes in a detailed manner the mineral localities of a country. Among the best examples are the lexicon of Zepharovich and Becke for Austria; that of Frenzel for Saxony; and, on a much more elaborate scale, the treatise by Lacroix on the mineralogy of France and her colonies, which is still in progress.

Greg and Lettsom's "Mineralogy of Great Britain and Ireland" (1858) is also a very useful book of reference, but scarcely adequate at the present date. Much of that work was actually due to Prof. Heddle; and it was known that he was for many years collecting materials for a "Mineralogy of Scotland"; no man possessed anything like his intimate knowledge of Scotch localities, so that a treatise of considerable importance and magnitude was expected from him.

After his death the unfinished manuscript was left to Mr. Alexander Thoms, who placed the work of completion in the competent hands of Mr. J. G. Goodchild. The present handsome volumes are the result, and it is evident that no trouble has been spared in their production. The book is a worthy monument of Prof. Heddle's lifelong labours, and will rank with the above-mentioned treatise of Lacroix.

Mr. Goodchild's task must have been a heavy one. There was a great mass of detail to be sifted; many of the localities have been difficult to identify, having been phonetically spelt by the author in his early journeys and not existing in the maps; further, it is not known to what specimens many of the figures relate, or what is the meaning of their symbols.

Prof. Heddle was an expert draughtsman, and there are no less than 103 plates, each containing about eight figures beautifully drawn and engraved. But many of these are taken from other sources, and their origin is doubtful. Confronted with the impossibility of making a trustworthy selection, the editor has thought it best to

publish all the figures, though many of them have, perhaps, little direct bearing on the mineralogy of Scotland. These figures, and the numerous chemical analyses quoted throughout the book bear witness to Prof. Heddle's untiring industry.

In addition to these plates, a remarkable feature of the book is a number of beautiful and elaborate stereographic and gnomonic projections drawn by Mr. Wilbert Goodchild. The only book which has hitherto been provided with such complete stereographic projections is Des-Cloizeaux's "Manuel de Minéralogie," and even they are not so elaborate as those which adorn the present book. The gnomonic projections are quite a new feature, and will probably be found useful. The book is, further, provided with very complete tables and indices of mineral names, localities, pseudomorphs, &c.

A great part of such a book as this must necessarily consist of a mere list of localities; but, in addition, an account of the crystalline forms and of the physical and chemical properties is given for each mineral, and under some species will be found a good deal of interesting comment and historical information—conspicuous examples are gold, silver, galena and niccolite.

The reader's attention may be particularly directed to the description of agate and onyx, where he will find a very interesting and suggestive account of their probable mode of formation.

The most important part of the book is the description of the mineral localities; errors in the other portions are not of so much account, but it may be noted that it is not correct to call the form *x* of quartz a double three-sided pyramid, nor the face *a* the twin plane of pyrites.

The term *gleit-face* is a curiously hybrid expression for the glide-plane (*Gleitenebene*) of calcite, and some of the terms used in the description of the varieties of agate, such as Jasp-agate, Oonachatae, Hæmachatae, Hæma-ovoid agate, can scarcely be regarded as satisfactory.

One failing inseparable from a posthumous work of this character may be noted; the reader, not knowing how much is generally established fact, and how much derived from incomplete or inadequate notes of the author, cannot feel equal confidence in all the statements. It is difficult, for example, to feel entire confidence in the occurrences of some obscure minerals, or in the identification of many of the crystal forms. It would have been well if Mr. Goodchild could have distinguished in some way those statements which he has been able to confirm from his personal knowledge and from his own extensive experience or from that of others. An appendix which contains some of his own observations is for this reason particularly valuable.

The book, as a whole, is remarkably free from the ornate style and the tinge of romance displayed by many of Prof. Heddle's published papers. It must long remain the standard treatise on the mineralogy of Scotland. It is satisfactory to know that the author's extensive collection of Scotch minerals is in the Museum of Science and Art at Edinburgh, and has been carefully arranged and made intelligible to the public by Mr. Goodchild, to whom the hearty thanks of all mineralogists are due for the labour and care which he has bestowed both upon the collection and upon the present treatise.

H. A. MIERS.